Burt Shephard/R10/USEPA/US
03/28/2012 10:01 AM

To Elizabeth Allen
cc Joe Goulet
bcc
Subject Re: Fw: Triangle Lake, Oregon contaminants investigation - I may have dumped this in draft instead of send - sorry

Elizabeth,

What's low calcium or low hardness in the Triangle Lake system? Lake acidification doesn't really begin to occur until water hardness gets down below 20 mg/L, and usually substantially below 20 mg/L. The really acidified lakes like the one I did my doctoral disseration on have hardness levels on the order of 1 - 2 mg/L. Actually, its low alkalinity that determines the propensity of a lake to become acidic, not low hardness as is found in soft water, as its the alkalinity that describes the buffering capacity, or lack thereof, in an aquatic system. Its unusual and likely doesn't occur at Triangle Lake, but there are some waters that have high alkalinity and low hardness. These are usually waters where the alkalinity comes from either sodium bicarbonate or sodium borate, not calcium carbonate.

Humic and fulvic acids resulting from decay of organic matter such as leaves in surface waters can and do also contribute to alkalinity in surface water, as the organics can bind with protons (the organic moiety is a conjugate base in chemistry speak). Not sure where Ray is going with his comments on lead concentrations, but one thing to keep in mind is that the hardness adjustment for the lead aquatic life criteria is designed to work only in waters of 20 - 400 mg/L hardness. The hardness-toxicity relationship breaks down in either very soft or very hard water.

Best regards,

Burt Shephard
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"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"
- Ernest Rutherford

Elizabeth Allen ----- Forwarded by Elizabeth Allen/R10/USEPA/... 03/27/2012 09:42:00 AM

From: Elizabeth Allen/R10/USEPA/US
To: Joe Goulet/R10/USEPA/US@EPA, Burt Shephard/R10/USEPA/US@EPA,
Date: 03/27/2012 09:42 AM
Subject: Fw: Triangle Lake, Oregon contaminants investigation

----- Forwarded by Elizabeth Allen/R10/USEPA/US on 03/27/2012 09:41 AM -----

From: "Ray Kinney" (b) (6)
To: Elizabeth Allen/R10/USEPA/US@EPA
Cc: "Ray Kinney" (b) (6)

Date: 03/26/2012 04:33 PM
Subject: Triangle Lake, Oregon contaminants investigation

Hi Elizabeth,

I understand from Karen Bishop that the investigation is seeking data that may pertain to the toxicologic significance of chronic or acute contaminant exposure potentials in the study areas. I have been involved for a good number of years in water quality assessment for salmon streams in the Siuslaw watershed. Since any aerial sourcing of contaminants associated with some of the management practices in question would not only be a potential factor in human urine analysis, but would also then be likely to be affecting waters of the state, I have concerns about progress of the investigation and how some generally unrecognized environmental conditions may play into the toxicology.

One of the most salient features of these waters is the low hardness (as CaCO3 mg/l) that predominates. Low calcium conditions are prone to acidification pressures and lack of sufficient buffering capasity to prevent frequency and severity of pH and CaCO3 dips to very low levels episodically during rain and snow melt events. Another anthropogenic acidification pressure locally, that may be adding to these dips, is the high percent red alder vegetation cover in the coast range. In a drainage area that has nearly 50% red alder total covreage, the nitrification by the alder produces excess amounts of nitrate and H ions that are more than the forest trees can effectively utilize. These nitrates and H ions can then enter the waters and site specifically become an acidification pressure in additive fashion to the already very low exchangeable calcium levels.

You may be aware of all of this already, but may toxicologists unfamiliar with the localized high risk factors compared to most of the waters in the rest of the nation don't often think to plug these associative factors into toxicity assessment. This lack of understanding contributes to many generally misleading comments and assurances to natural resource managers, researchers, funders, public health, and aquatic health folks who rely on advice to plan their priorities and best management practices.

If low calcium conditions, somewhat increasingly, limit calcium utilization by organisms already low in their preference range for bioavailable calcium, it can tip them out of their preference range and into hypocalcemia. There is some evidence of stream organisms that appear to be so affected locally. Ranges of hardness are commonly 6 to 22 mg/l before the episodic lower dips take place.

Our very soft surface water may have unsuspected effects on contaminant transport, species, ligands, mobilization, etc. that could play into unusual toxic environmental fate, uptake, and fitness of organisms (probably including humans).

I wanted to provide a bit of this info to you and the team as you ponder the data collections and assessments.

ODEQ data in LASAR on local waters appears to have been a little misleading for the hardness dependent metal lead in or close to the study areas. ODEQ collected WQ data in '99 on upper Lake Creek close to Triangle Lake that indicated somewhat elevated lead levels in the stream waters. They reported back that it was rather insignificant, as it was 'just a couple of clicks' above the level of concern. When I requested and saw the raw data, I suspected that they had not applied the correct criteria adjustment for hardness dependency to the data assessment. I asked if they had done so, and the answer was that they had not.

they said that they would have to rethink the assessment of this data and get back to me with advice about it... I never heard back about it. Asking again just refered me back to the LASAR data. Now this brings up a question of how they have assessed other hardness dependent metals data for 303d listings. Have they neglected to apply the correct criteria during their listing processes for CWA EPA reporting for these low calcium high risk waters in the mid coast Oregon salmon streams? If so, have local resource managers, of which I am one, been effectively led astray for environmental assessments and priorities for funding and project development needlessly? Since TMDL assessment that is ongoing relies on LASAR data and ODEQ assessment in listings to guide needed NPS pollutant mitigation development of BMPs and mitigation of legal pressures on the TMDL, I would like to know if it is really possible that hardness dependent metals polluting these waters (sinkers, bullets, bridge paint leaching and flakes etc.) constitute a potentially listable 303d contaminant risk that has erroneously been excluded from listing, or conversely that I am wrong and there just is not any data available that indicate pollution is happening. Pollution is obviously happening, there just has not been enough funding to provide new data beyond what has already been in the LASAR database from the work ODEQ had done in the late 90's.That data showed

exceedence was probably happening, but perhaps percent exceedence kicked it out of the running for listing in 303d without additional sampling.

Anyway, my concern is, possibly, that 303d listings don't reflect the data accurately. But maybe I am mistaken, and ODEQ has properly assessed low calcium waters for lead level data in western Oregon for 303d. I would like to know EPA thoughts on this troubling possibility.

I'm running on and on, sidetracked from the T Lake investigation. I wanted to let you know of these environmental conditions that most people do not know to think about during such an investigation in low calcium waters.

Thanks for your ear on this.

Any comment appreciated, whenever it seems warranted.

Ray Kinney
Siuslaw water quality advocate
(b) (6)
[redacted]